

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

REMARKS/ARGUMENTS

These remarks are in response to the Office action mailed on October 10, 2006. Claim 34 has been amended and claim 35 has been cancelled. Claims 1-11 and 13-34 are pending in this application. Reconsideration on the basis of the above amendments and remarks below is kindly requested.

The Examiner rejected claims 1-3, 6, 10, 11, 13, 14, 16, 20, 27-29 and 31-34 under 35 U.S.C. §103(a) as being unpatentable over Bovenkerk et al., U.S. Patent No. 4,311,490 ("Bovenkerk '490") in view of Bovenkerk et al., U.S. Patent No. 4,224,380 ("Bovenkerk '380"). Claim 1 is directed to a method for forming an ultra hard layer which comprises providing a refractory metal enclosure having an inner wall, disposing a metallic liner within said enclosure, placing ultra hard material feed stock within said enclosure, and sintering to convert the ultra hard material feed stock to a solid ultra hard material layer having a peripheral portion infiltrated by the metallic liner, and removing the peripheral portion. Bovenkerk '490, according to the Examiner, discloses placing, within a protective shield metal enclosure which has an inner wall, massive abrasive crystals and a massive catalyst metal, which the Examiner has considered to be equivalent to the claimed liner. Bovenkerk '490, according to the Examiner, is silent on the infiltration of the diamond or CBN compact by the interface binder, and on the removing of the infiltrated portion. Bovenkerk '380 according to the Examiner, discloses the removal of the infiltrated material in the abstract. In the abstract, Bovenkerk '380 states "The method for making such a compact comprises the steps of bonding a mass of abrasive particles, aided by a sintering aid material, under high temperatures and high pressures (HT/HP) to form an abrasive body comprised of said particles in a self-bonded form and said material infiltrated throughout the body. The body is then treated to remove substantially all infiltrated material, . . . " In other words, Bovenkerk '380 teaches removing the sintering aid material which is infiltrated throughout the body. Bovenkerk '380 does not appear to disclose, teach or suggest the removal of a peripheral portion of the abrasive body itself, but rather appears to teach the removal of the material infiltrating the entire body. Bovenkerk '490 also does not appear to teach the removal of

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

a peripheral portion. Consequently, these references, alone or in combination, cannot render claim 1 obvious.

Claims 2, 3, 6, 10, 11, 13, 14, 16, 20, 27 and 28 are all dependent from claim 1. As such, Applicant submits that Bovenkerk '380 and Bovenkerk '490 also do not render these claims obvious as these claims are dependent from a claim that is not rendered obvious by Bovenkerk '380 and Bovenkerk '490 and for the additional limitations these claims contain therein.

Claim 34 has been amended to include the limitations of claim 35. Consequently, the rejection to claim 34 is now moot. Claims 29, 31 and 32 are dependent from claim 21 and claim 33 is dependent from claim 23. As neither claims 21 nor 23 were rejected over Bovenkerk '490 in view of Bovenkerk '380, the rejections to these claims over these two references appear to be improper and should be withdrawn.

The Examiner rejected claims 4, 5, and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Bovenkerk '490 in view of Bovenkerk '380 as applied to claim 1, and further in view of Griffin et al., U.S. Patent No. 6,439,327. Claims 4, 5, 17 and 19 are dependent from claim 1. Griffin et al. also does not appear to disclose the removal of the peripheral portion of the ultra hard material layer. In fact, Griffin et al. on column 4, lines 41-51, appears to disclose the retention of the peripheral portion of the ultra hard material layer. Thus, Griffin et al. will dissuade someone from removing the peripheral portion. As such, the combination of Bovenkerk '490, Bovenkerk '380 and Griffin et al. cannot render claim 1 obvious. Consequently, these references also cannot render claims 4, 5 and 17-19 obvious, as these claims are dependent from a claim which is not rendered obvious by these references and for the additional limitations that these claims contain therein.

The Examiner rejected claims 7-9, 15, 21, 22, 24-26 and 30 under 35 U.S.C. §103(a) as being unpatentable over Bovenkerk '490, in view of Bovenkerk '380 as applied in claim 1 and further in view of Gigl, U.S. Patent 4,525,179. Claims 7-9 and 15 are dependent from claim 1. Gigl also does not appear to disclose the removal of a peripheral portion of the ultra hard material layer as required by claim 1. Consequently, the combination of Bovenkerk '490, Bovenkerk '380 and Gigl cannot render claim 1 obvious. As such, claims 7-9 and 15 also cannot

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

be rendered obvious over these references because these references do not render claim 1 obvious and because of the additional limitations that these claims contain therein.

Claim 7 requires that during sintering, the liner and at least a compound of the ultra hard material feed stock form a eutectic having a melting temperature lower than a melting temperature eutectic of the substrate material. Claim 8 requires that the two eutectics have a melting temperature about the same. Claim 9 requires that the liner, ultra hard material and the enclosure form a eutectic having a melting temperature in the range of 1100°C to about 1410°C. Claim 21 requires that the liner forms a eutectic having a melting temperature, wherein the substrate forms a eutectic having a melting temperature, and wherein the melting temperature of the liner form eutectic is within 310°C of the substrate formed eutectic. Claim 22 is dependent from claim 21 and requires that the liner and a compound of the ultra hard material feed stock form a eutectic having a melting temperature that is about the same as that of a eutectic of the substrate material. Claim 24 is dependent from claim 23 and requires that during sintering, the liner of the enclosure and the compound of the ultra hard material feed stock form a eutectic having a melting temperature lower than a melting temperature of the eutectic of the substrate material. Claim 25 is also dependent from claim 23 and requires that during sintering, the liner, the enclosure and a compound of the ultra hard material feed stock form a eutectic having a melting temperature about the same as that of a eutectic of the substrate material. Claim 26 is dependent from claim 23 and requires that the enclosure and a compound of the ultra hard material feed stock form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C. Claim 30 is dependent from claim 21 and requires that during sintering, a eutectic is formed between the liner and a compound of the ultra hard material and the enclosure that has a melting temperature in the range of about 1100°C to 1410°C.

First, Applicants want to point out that the rejections to claims 24-26 are improper over these references, as claim 23 was not rejected over these references and claims 24-26 are dependent from claim 23. Nevertheless, neither of the cited references appears to disclose the features claimed by claims 24-26. The Examiner states that Gigl is silent on eutectics, but that the eutectics and their melting temperatures have already been published before the instant of the

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

invention of the Applicants and are accessible to the public. The Examiner, however, has not pointed where these eutectics have been published, nor has the Examiner provided any evidence that either of these cited references provides a suggestion or a motivation to be combined, as suggested by the Examiner. Even if the eutectics and their melting temperatures have been published as suggested by the Examiner, that does not mean that one skilled in the art would have been motivated to combine the references and the publications as suggested by the Examiner. There is no teaching that appears in either of the cited references that will suggest that the materials must be chosen such that the eutectics have the claimed melting temperatures. Consequently, for these additional aforementioned reasons, the rejections to claims 7-9, 21, 22, 24-26 and 30 over Bovenkerk '490 in view of Bovenkerk '380 and in view of Gigl are improper and should be withdrawn.

The Examiner rejected claim 23 under 35 U.S.C. §103(a) as being unpatentable over Bovenkerk et al '490 in view of Bovenkerk et al. '380 as applied to claim 1 and further in view of Cerutti et al., U.S. Patent No. 5,603,070. According to the Examiner, Cerutti et al. discloses reduced risk of stress cracking and delamination and the like. Furthermore, according to the Examiner, Cerutti et al. teaches that upon heating and cooling, the stresses generated are relieved principally through the deformation of the abrasive table. The section of Cerutti et al. cited by the Examiner, however, teaches that "Upon heating and cooling, the stresses generated are relieved principally through the deformation of the abrasive table which may result in its stress cracking and its delamination from its support." (Emphasis added) According to the Examiner, Cerutti et al. is silent on that its interlayer forms a plastically deformable region during a cooling phase of the sintering. However, according to the Examiner, it would have been obvious to one having ordinary skill in the art at the time of the invention that during the sintering cooling process, the catalyst metal is in a molten state as disclosed by Bovenkerk '380 and it will form a plastically deformable region during cooling. The Cerutti interlayer is an interlayer of cubic boron nitride and not a sintering aid material such as cobalt, as disclosed by Bovenkerk '380. Bovenkerk '380 discloses that the sintering aid material which is cobalt, not cubic boron nitride, will melt. Consequently, it is not clear how the Examiner has come to the opinion that the CBN

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

interlayer disclosed in Cerutti et al. will melt to form a plastically deformable region, during the cooling phase of the sintering process. Neither of these three cited references appears to disclose the use of a liner which will form a plastically deformable region during sintering for preventing the formation of cracks on the ultra hard material adjacent the plastically deformable region during a cooling phase of the sintering. In fact, Cerutti et al. discloses in column 4, lines 4-6 cited by the Examiner, that the stresses are relieved through deformation of the abrasive table which may result in stress cracking. This is completely opposite from what is being claimed by claim 23, which requires that the plastically deformable region is there for preventing the formation of cracks. Cerutti et al. will not motivate one skilled in the art to combine the references as suggested by the Examiner. In fact, Cerutti et al. would dissuade one skilled in the art from combining such references. Consequently, the Examiner's rejection to claim 23 is improper and should be withdrawn.

The Examiner rejected claim 35 under U.S.C. §103(a) as being unpatentable over Bovenkerk '490 in view of Bovenkerk '380 and further in view of Csillag, U.S. Patent 4,797,326. The limitations of claim 35 have been added into claim 34. As such, Applicants assume that this rejection will now apply to claim 34. Claim 34 requires disposing a liner within an enclosure and placing ultra hard material feed stock within the liner. Neither of these cited references appear to disclose disposing a liner within an enclosure and placing ultra hard material feed stock within the liner. Neither of the three cited references appear to disclose the placing of ultra hard material feed stock within a liner. Bovenkerk '490 appears to disclose a substrate material which includes a catalyst which is disposed within a reaction cell along with a mass of abrasive crystals. Bovenkerk '380 appears to disclose use of CBN particles and a mass of a material which is active as a sintering aid with a particle mass. Csillag appears to disclose an interface binder. However, neither of these three references appears to disclose that the ultra hard material feed stock is positioned "within said liner" as required by claim 34. As such, Applicants submit that claim 34 is also not rendered obvious by Bovenkerk '490 in view of Bovenkerk '380 and further view of Csillag.

Appln No. 10/731,710
Amdt date December 5, 2006
Reply to Office action of October 10, 2006

The rejections to all claims pending in this application are believed to have been overcome and this application is now believed to be in condition for allowance. Should the Examiner have any remaining questions or concerns about the allowability of this application, the Examiner is kindly requested to call the undersigned attorney to discuss them.

Respectfully submitted,
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